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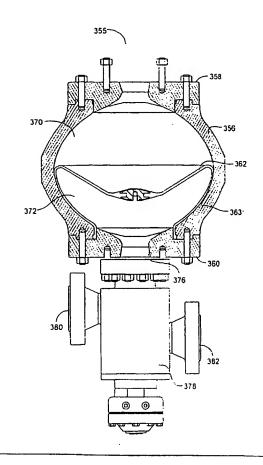
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(57) Abstract

A positive-displacement pump (102) includes multiple pumping elements (355, 356). Each pumping element having a pressure vessel (356) with a first (372) and a second (370) chamber and a separating member (362) disposed between the first (372) and second (370) chambers. The first (372) chambers and the second (370) chambers are hydraulically connected to receive and discharge fluid, wherein the separating members (362) move within the pressure vessels (356) in response to pressure differential between the first (372) and second (370) chambers. A valve assembly (378) having suction (380) and discharge (382) valves communicates with the first (372) chambers. The suction (380) and discharge (382) valves are operable to permit fluid to alternately flow into and out of the first (372) chambers. A hydraulic drive (420) alternately supplies hydraulic fluid to and withdraws hydraulic fluid from the second (370) chambers such that the fluid discharged from the first (372) chambers is free of pulsation.



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	o International Patent Classification (IPC) or to both	national classification and IPC		
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U.S. : 4	417/390, 392, 395, 401, 505, 521, 533; 137/596.17;	251/129.07, 324, 282.		
Documentat	ion searched other than minimum documentation to the	extent that such documents are included	in the fields scarched	
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c. Doc	UMENTS CONSIDERED TO BE RELEVANT			
Category*	Citation of document, with indication, where ap	propriate, of the relevant passages	Relevant to claim No.	
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Х	US 4,755,111 A (Cocchi et al.) 05 July lines 20-21; generally see all.	1-2, 4, 8, 11		
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x	US 5,924,448 A (West) 20 July 199 related US application data.	1-2, 4, 11		
X	US 4,832,005 A (Takamiya et al.) 23 34-45 and col. 4, lines 65-68.	May 1989, see col. 4, lines	1-2, 4, 11-13	
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International application No.
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International application No. PCT/US99/06111

B. FIELDS SEARCHED Electronic data bases consulted (Name of data base and where practicable terms used):								
APS, EAST. searche terms: pump, diaphragm, piston, hydraulie, subsea, mud. fluid, liquid, pulse, pulsation, reduce, valve, booster, positive, displacement, control, reverse flow, actuator, pressure, plunger, ribs, position, locatior, pressure senor.								